

Quadratic Equations

A quadratic or second degree equation is an equation that can be written in the form $ax^2 + bx + c = 0$, where a, b , and c are real numbers and $a \neq 0$.

Square Root Property:

If k is a real number and if $x^2 = k$, then $x = \pm\sqrt{k}$

Examples (pg. 505 -506):

$$x^2 = 25$$

$$3x^2 = 6$$

$$-5x^2 + 2 = 0$$

$$4x^2 + 9 = 0$$

The Principle of Square Roots (Generalized Form):

For any real number k and any algebraic expression X : If $X^2 = k$, then $X = \pm\sqrt{k}$.

Examples (pg. 506-507):

Let $f(x) = (x - 2)^2$. Find all x -values for which $f(x) = 7$

Solve: $x^2 + 6x + 9 = 2$

Solving a Quadratic Equation in x by Completing the Square (pg. 507-509):

Step 1: If the coefficient of x^2 is 1, go to Step 2. Otherwise, divide both sides of the equation by the coefficient of x^2 .

Step 2: Isolate all variable terms on one side of the equation.

Step 3: Complete the square for the resulting binomial by adding the square of half of the coefficient of x to both sides of the equation.

Step 4: Factor the resulting perfect square trinomial and write it as the square of a binomial.

Step 5: Use the square root property to solve for x.

Examples:

Replace the blanks in each equation with constants to form a true equation.

$$x^2 + 14x + \underline{\hspace{2cm}} = (x + \underline{\hspace{1cm}})^2$$

$$x^2 - 5x + \underline{\hspace{2cm}} = (x - \underline{\hspace{1cm}})^2$$

$$x^2 + \frac{3}{4}x + \underline{\hspace{2cm}} = (x + \underline{\hspace{1cm}})^2$$

Solve: $x^2 - 8x - 7 = 0$

Find the x-intercepts of the graph of $f(x) = x^2 + 5x - 3$

Problem Solving (pg. 510-511)

The Compound-Interest Formula

If an amount of money P is invested at interest rate r, compounded annually, then in t years, it will grow to the amount A given by

$$A = P(1 + r)^t$$

Examples:

Katie invested \$4000 at interest rate r, compounded annually. In 2 years, it grew to \$4410. What was the interest rate?

The formula $s = 16t^2$ is used to approximate the distance s , in feet, that an object falls freely from rest in t seconds. The Grand Canyon Skywalk is 4000 feet above the Colorado River. How long will it take a stone to fall from the Skywalk to the river? Round your answer to the nearest tenth of a second.